

**Southwestern Renewable Portfolio Scenario
A Strawman Proposal**

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Background

California transmission planners are considering the implications of a scenario in which a significant fraction of the renewable energy needed to meet the state's target is imported from or through neighboring Southwestern states. In addition to considerations of bulk power flows into Southern California, it is also important to assess the likelihood that sufficient renewable generation will be developed with access to the California transmission system. This paper addresses Western renewable resources which might reasonably be expected to be available for import into Southern California and proposes a scenario to serve as a strawman for discussion.

SW Solar Energy Potential

Southwestern states have considerable potential for development of solar electric resources and lesser amounts of wind and geothermal potential. Substantial solar development could occur in Western Renewable Energy Zones (WREZ) near California's border in Southern Nevada and Western Arizona¹, thereby minimizing the need for new long distance transmission to access the California grid.² 1,048 MW is already under contract to California investor-owned utilities (IOUs), expected to generate approximately 3,000 GWh per year.³ A much larger amount of potential solar capacity is represented by solar projects which have requested interconnection to the Nevada and Arizona grids. Approximately 17,000 MW of solar capacity is in the interconnection queues, representing approximately 42,000 GWh per year of electric energy.⁴

Transmission facilities which could connect these projects to the California grid are in the planning stages.⁵ In addition, transmission is being considered which could connect solar generators in other regions to the Marketplace and Palo Verde hubs for export to California.

The cost of solar energy in the zones near California is expected to be somewhat higher than for California resources, due to additional transmission requirements and line losses. Nevertheless, the differential is expected to be small and may be offset by lower permitting costs and other factors. It is reasonable to conclude that a substantial fraction of California's renewable 'net short', about 50,000 GWh/year, could be met with resources close to the state's border and delivered to substations at Mountain Pass, Blythe, and North Gila.

However, it may not be prudent to include too much of the potentially available solar generation in the import scenario. Technical issues have been raised regarding large amounts of variable

¹ Black & Veatch identifies these zones as NV_SW (which has been extended to include the Las Vegas area,) AZ_NW and AZ_WE, Western Renewable Energy Zones, Phase 1: QRA Identification Technical Report, Black & Veatch, October 2009, pp 107 & 109.

² SWAT RTFF Technical Committee Report, August 17, 2010

³ http://www.cpuc.ca.gov/NR/rdonlyres/4F9704D2-8B5A-4AC8-8D90-89DD640B6139/0/RPS_Project_Status_Table_September.XLS

⁴ In the three Nevada and Arizona zones considered here, there are also wind projects in the interconnection queues with about 2500 MW of capacity, providing about 6,000 GWh per year of energy. See SWAT Report.

⁵ http://www.energy.ca.gov/reti/steering/workgroups/regional/2010-09-02_meeting/SWAT_Update_to_RETI_09-02-2010.pdf

solar energy in utility supplies. In addition, financing requirements are daunting, especially for a relatively new technology at the scale envisioned. RETI should consider the advisability of limiting the amount of solar energy included in the SW import scenario, despite the proximity of solar resources to the California border.

SW Wind Energy Potential

The WREZ whose solar potential is discussed above also include smaller but substantial amounts of wind energy potential, approximately 2,500 MW of capacity and 6,000 GWh/yr of energy. Additional wind resources are located in Western Utah, Eastern Arizona and New Mexico, and in Baja California. If adequate transmission capacity were to become available, these resources could also be considered for export to California. The cost of wind energy development is expected to be lower than for solar development, but the higher transmission cost from more distant areas offsets lower development cost except in the case of Utah wind, which has been estimated to have a delivered cost about \$30/MWh lower than solar costs discussed above.⁶

Nevertheless, RETI should consider inclusion of more remote wind resources in its SW import scenario in order to limit the scenario's dependence on solar energy.

SW Geothermal Energy Potential

Southwestern geothermal outside California are located primarily in Nevada in the general vicinity of Reno. Approximately 400 MW of potential geothermal generation are being explored on BLM lands⁷ and XXX megawatts are in the NV Energy queue. Some of these projects may deliver energy to California with transmission to the north. New trans-Sierra transmission capacity between the Reno and Sacramento areas is being discussed, as are transmission upgrades for imports into Southern California through the Owens Valley corridor. Transmission between the Reno and Las Vegas areas has been under discussion for many years.⁸

As a result of the uncertainty and potential costs associated with new transmission, it is unclear what the expectations are for geothermal energy imports into Southern California, nor the cost of these imports.

Strawman SW Renewable Import Scenario Development

Based on currently available data, it is not unreasonable to expect that, by 2020, sufficient renewable generation and transmission development may occur to enable California to import a substantial fraction of its renewable energy requirements into Southern California. More data will be collected before scenario options are presented to the RETI Stakeholder Steering Committee.

The following is a sketch of a strawman Southwestern renewable import scenario for *purposes of assessing the impact on California transmission only*:

1. Nevada and Arizona solar, wind and geothermal resources are included in the scenario if they are located near the California border and transmission is expected to be available to connect to the California grid. Note that this choice represents a proxy for

⁶ RETI Phase 2B Report, Table 7-2, <http://www.energy.ca.gov/2010publications/RETI-1000-2010-002/RETI-1000-2010-002-F.PDF>

⁷ BLM Active Generation Projects as of August 17, 2010.

⁸ SWAT Report.

available resources and does not preclude competition from other resources throughout the West which may become available at the Southern California border.

2. In order to produce a balanced portfolio, the resources in (1) may be augmented by
 - a. Reno-area geothermal;
 - b. Baja wind;
 - c. Utah wind;
 - d. Other SW wind resources accessible via existing or planned transmission facilities.
3. Solar resources in (1) will be discounted to a level deemed appropriate, and other resources included to provide a total which is an appropriate percentage of the RETI net short, as determined by the SSC and CTPG. For purposes of illustration, 40% may be used.